

Forest Connectivity in the Developing Landscape

A Design Guide for Conservation Developments

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DESIGNING FOR FOREST CONNECTIVITY IN CONSERVATION SUBDIVISIONS 2020



Potential home buyers cite trails and access to nature as one of their top desired amenities.

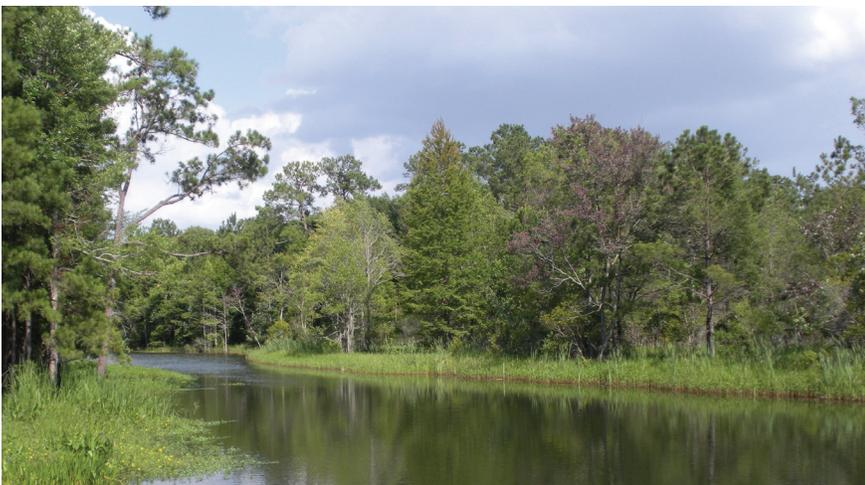


Clearing an entire site before building destroys the site's natural beauty and removes nourishing topsoil.

Forests are increasingly at risk from development. Yet we can develop in ways that protect healthy forests and provide opportunities to enjoy them. This requires planning differently – with conservation development design. A conservation development design protects at least 50% or more of connected forest lands, buffers surface waters, and protects soils, while providing access to nature! Conservation developments also cost 34% less to develop than traditional layouts, since reducing the development area results in less infrastructure, such as roads and stormwater structures. (Thomas 1991).

Unfortunately, developments often clear the land entirely before building begins. Lot-line to lot-line clearing can take decades to repair lost topsoil and to replace 'ecosystem services' that mature trees and forests provide. All these services impact our health and the health of our community. Services include:

- moderating temperate extremes
- reducing stormwater runoff/flooding
- water quality protection and recharge
- better air quality
- access to nature
- reduced energy demand and costs
- better real estate values



Natural systems should be respected and protected from harm.

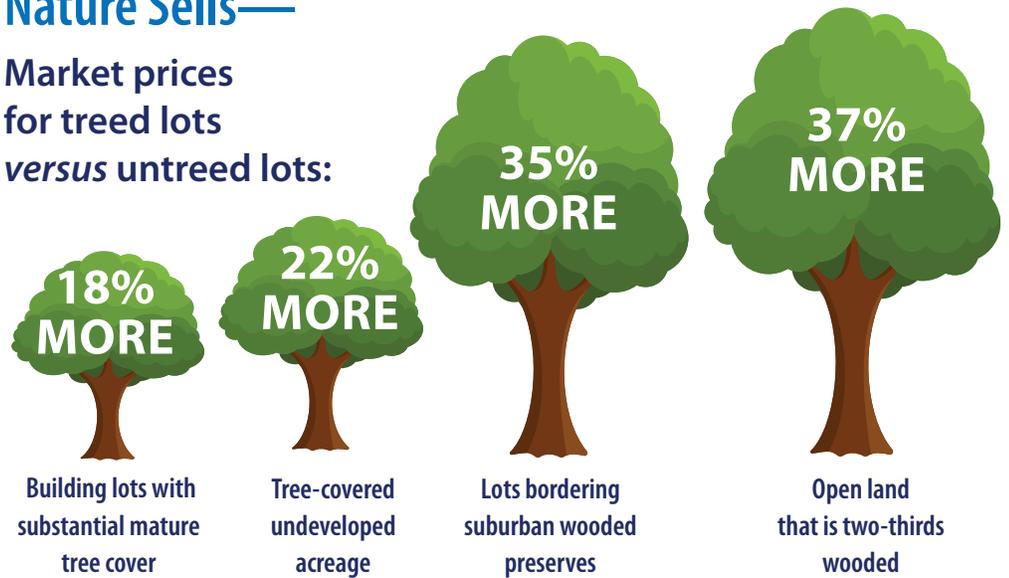
Development does not need to start with the landscape as a blank slate entirely stripped of trees. **Communities can continue to grow while retaining trees and forests and associated ecosystem services.** Municipalities, developers, planners, foresters and landscape designers can use conservation development design principles to conserve the landscape, provide healthful communities and realize better economic returns.

Conservation subdivision design requires conserving at least 50% of the land in a natural (non-manicured) state,

connected throughout the development and to outside parcel boundaries. The design process also determines the most important ecological features, such as key habitat cores and corridors and places them 'off limits' to building. Tree canopy should be conserved in developed areas since trees shade streets and residences and provide more attractive developments. Following are best practices and steps to achieve a true conservation subdivision design. Developments with trees sell faster and for greater profits! (*Benedict and McMahon 2006*).

Nature Sells—

Market prices for treed lots versus untreed lots:



Source: Kathleen Wolf, 2007, *City Trees and Property Values*.

Best Practices For Conservation Planning

Require Tree Canopy Coverage and Adequate Planting Areas in Codes

- Adopt a canopy coverage requirement for developed areas.
- Require planting of street trees with adequate planting spaces and choose a diversity of species.
- Conserve and protect large specimen trees during development and adopt tree conservation ordinances.

Enable Conservation Subdivision Zoning

- Adopt a conservation subdivision ordinance to require forested open space retention of at least 50% connected forests and other habitats.
- Provide incentives, such as expedited permitting for conservation designs.

Target Appropriate Locations for Development

- Choose an appropriate place to develop – not greenfields located far from daily needs, such as work, schools or shopping.
- Zone areas for development which are already close to built-up areas.

Foster Forest Connectivity and Habitats

- Require site plans to show areas for forest conservation.
- Protect large undisturbed forests areas called habitat cores and connect them with corridors to foster wildlife health and biodiversity.



Buyers want developments with green space and will pay 10% more to be close to nature! (*National Association of Realtors*)

STEPS FOR CONSERVATION DESIGN



The cerulean warbler dwells in large acreages of interior forest.

#1 Form the Design Team

Conservation design requires a diverse team of experts. In addition to civil engineers and planners, add foresters, landscape architects and natural resource managers, and geographic information specialists to evaluate which landscapes to conserve and connect.

#2 Create a Land Cover Map Using Aerial Imagery

A land cover map shows which areas are forested and older imagery can also show disturbed areas or long-standing forests containing larger trees.

#3 Conduct Field Visits

Ground truth the land cover map and determine site species diversity, location of old growth forests or fire-risk areas, such as overgrown areas that need thinning, as well as possible invasive species.

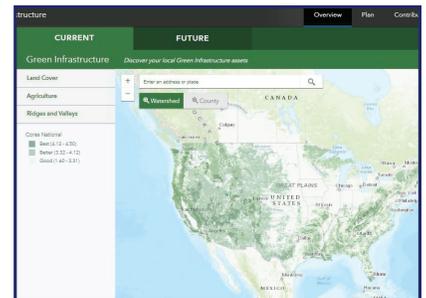
#4 Map Assets

Create overlay maps of natural assets including water resources and wetlands, forest cores and corridors, special wildlife areas and scenic views or historic areas.

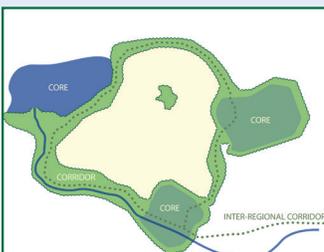
A conservation subdivision supports a multitude of native species, which requires protecting the forest interior.

- **Habitat Cores Layer:** Consult the Esri green infrastructure model to locate cores <https://www.esri.com/en-us/industries/green-infrastructure/overview> .

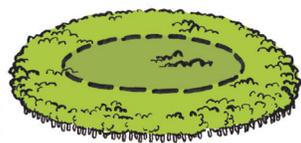
- **Water Resources:** Use a digital elevation model and national hydrography dataset, the National Wetlands Inventory and field surveys to map key water assets.



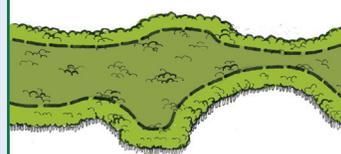
Landscape design principles for connectivity and resilience.



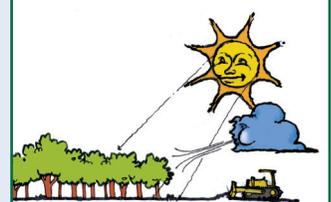
Habitat cores need to be linked by corridors to facilitate species movement.



Interior forest species in the south need at least 100 acres of interior forest habitat protected by an outer edge of an additional 300 feet. Habitat cores support wildlife.



Corridors are essential pathways for wildlife (and people) movement and should be at least 300 feet wide.



Too much edge area allows invasive species and other disturbances to impact wildlife.

#5 Map Site Constraints

Obtain NRCS soils data to locate erodible areas, unstable building geology or saturated wet soils indicating wetlands, along with steep slopes, lakes and streams to indicate areas to avoid building on.

#6 Create a Conservation/Buildable Areas Map

Combine the asset maps with the constraint maps to highlight areas to conserve (high value habitat cores, water resources) as well as areas suitable for building (avoidance of steep slopes, erodible and unstable soils) and site access and roads.

#7 Layout the Conservation Development

Use all the previous steps to locate areas for building using 50% or less of the total land area for building while conserving forest conservation and site connectivity, water and wetlands and access to nature.



Neighborhood creek crossing with low impacts

#8 Minimize Impacts by Designing With Nature

- Keep lot sizes small, and for larger lots, require two-thirds of the lot remain in native land cover.
- Buffer lakes and rivers with treed areas at least 100 to 300 feet wide and buffer smaller streams and springs by 50 to 100 feet. Do not pipe streams or dam springs.
- Provide access for nature enjoyment, but ensure minimal footprints for facilities and trails.
- Require landscaping with native species and disallow invasive non-native species and large lawn areas.
- Minimize pavement and use low-impact development best management practices such as permeable pavers.
- Use rainwater harvesting with rain barrels or cisterns to water landscapes.
- Ensure street and open-space trees are planted with adequate soil volume to grow.



Permeable parking in a residential subdivision.

#9 Provide Continual Natural Resources Management and Engage Residents

- Consult with your state forest service for assistance or hire a forester/ecologist to care for natural areas.
- Utilize forest management tools, such as prescribed burns and thinning, to prevent excess woody fuel buildup.



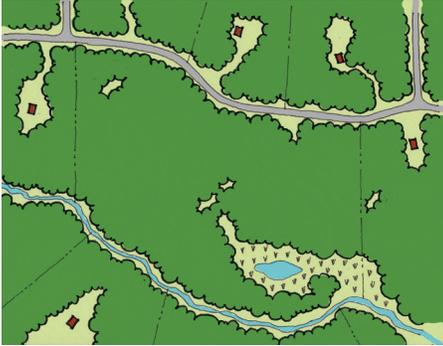
Prescribed burns are an important management tool to reduce excess fuel buildup while fostering new understory growth.

Image Credit: NC Forest Service

- Reduce fire risks through Firewise Design™ and teach principles to residents.
- Consider permits for tree removals and require industry certified arborists for tree work needs.
- Educate residents about managing native landscapes for indigenous species.
- Adopt nature-friendly rules such as dark skies and noise ordinances.

SPRAWL VERSUS COMPACT GREEN DESIGNS

In each of the examples below, a designer can keep the landscape connected or develop in a pattern that disconnects habitat.



EXISTING:

A parcel surrounded by residential development supports a riparian wildlife corridor and habitat core.



SPRAWL DESIGN:

Lots cover the entire parcel and trapped green space in the middle is now disconnected from the rest of the habitat core. Land is cleared down to the river for views and one lot impacts the wetland.



CONSERVATION DESIGN:

The riparian corridor is maintained through the site, fifty percent of land is kept in conservation, the wetlands are protected, and a trail provides access to the natural area.



EXISTING:

A parcel with a small farm surrounded by residential development supports a riparian wildlife corridor.



SPRAWL DESIGN:

Lots cover the entire parcel and large areas of mowed lawn and a garden provide open space for views. The stream corridor is broken by a road and some lots are cleared down to the river for views, while one lot impacts the wetland.



CONSERVATION DESIGN:

The riparian corridor is kept through the site, fifty percent of land is maintained in conservation, and a trail provides access to the natural area with wooden footbridges to cross the creek. A community garden is located close to residents. Lots remain mostly forested.

EXAMPLES OF CONSERVATION DESIGNS

Long Branch Development, South Carolina

Long Branch is a mostly wooded site located in Greenville County, SC, and is comprised of gently rolling Piedmont landscape. The site was already approved for conventional development with 1,865 units of housing on 75% of the land, leaving 25% open space. A land trust, Upstate Forever, suggested an option for a conservation subdivision. GIC redesigned the site to conserve more than 75% of the natural landscape (see box).

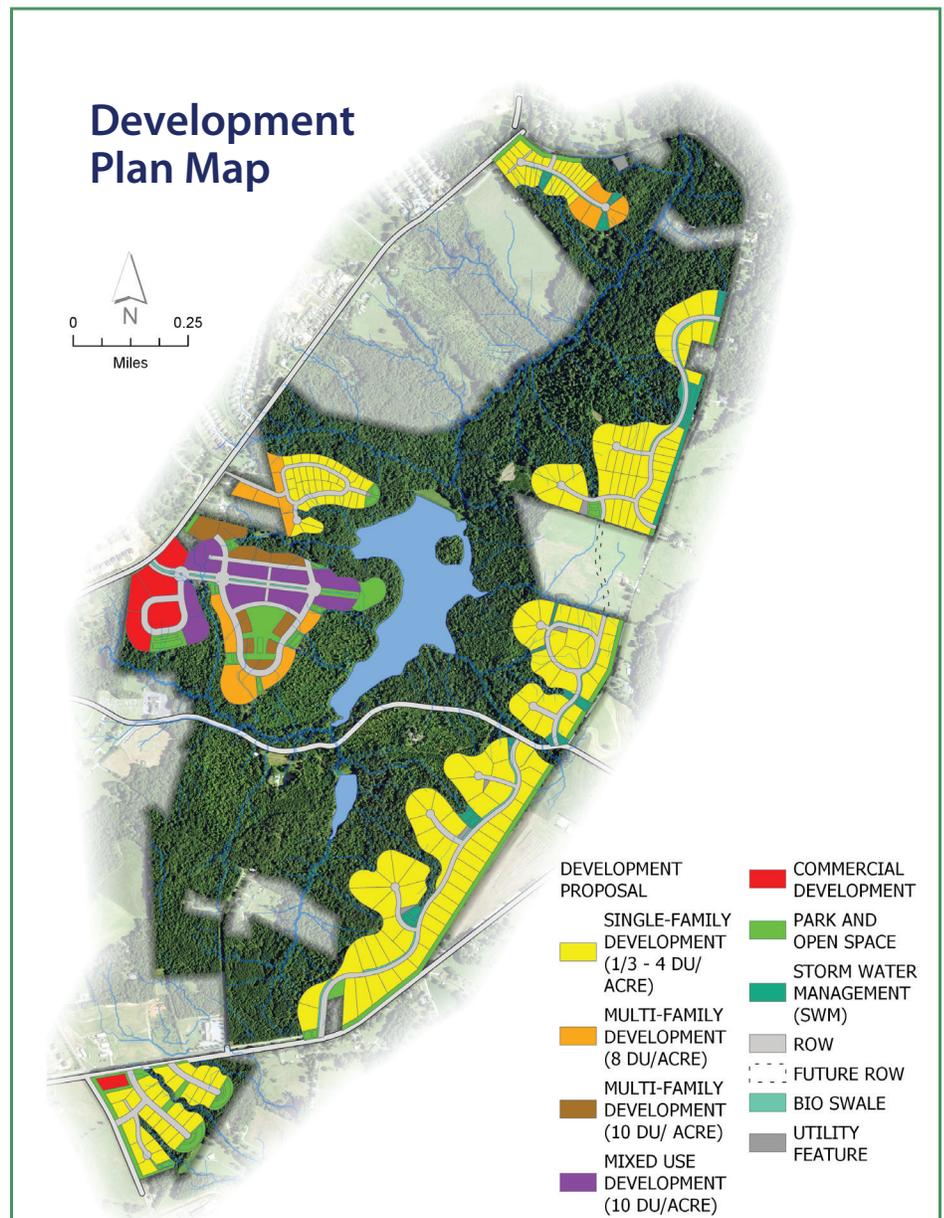


Long Branch Conservation Development Redesign

- Total area: 819 acres.
- 1,118 housing units, comprising single and multiple family units.
- Commercial area with shopping and services.
- Developed (parcels, roads and stormwater pond areas): 257 acres.
- Undeveloped (areas outside the development area plus open spaces in parks and trails): 561 acres.
- Water: 39 acres (36.34 acre lake and 2.36 acre pond).
- Miles of proposed trails: 5.46 miles.



Forest Core at Long Branch.



EXAMPLES OF CONSERVATION DESIGNS



Little White Oak Mountain in winter.

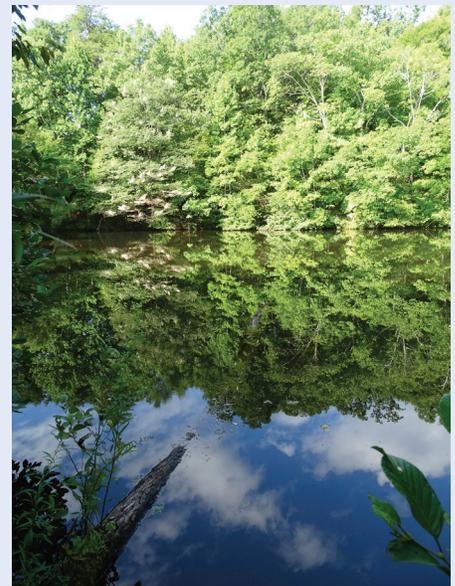
Little White Oak Mountain, Polk County, North Carolina

The ecologically-rich area on the south side of Little White Oak Mountain was originally slated for 687 homes on a 1,068-acre parcel. Instead, a land trust Conserving Carolina acquired the and donated 600 acres to the Green River Game Lands, and 300 acres for a park to Polk County, including 123 miles of streams and a planned 10-mile multiuse trail system. The remaining 35-acre tract was redesigned by GIC as conservation subdivision conserving more than 50% of the development area. The conservation design is just 2% of the original 1,068 acre tract.

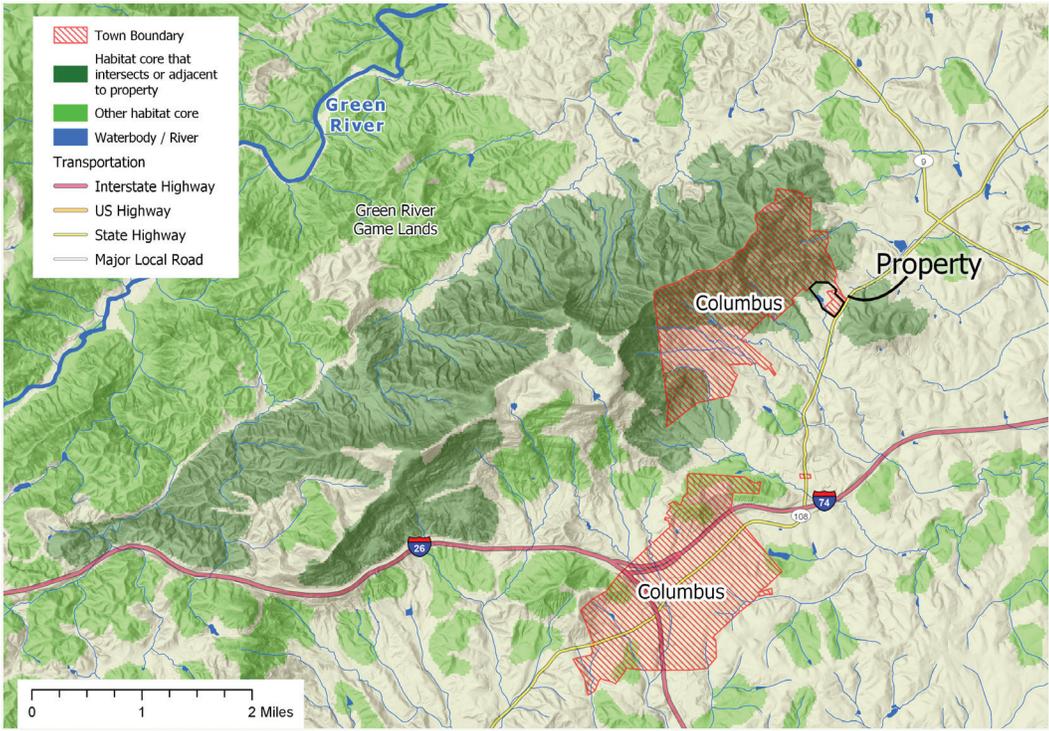
For more information and how to implement a conservation design and case studies see the guide *Forest Connectivity in the Developing Landscape: A Design Guide for Conservation Subdivisions*. For a free downloadable copy of the guide for conservation subdivision design visit www.gicinc.org or email firehock@gicinc.org to order a print copy for \$8.00 S/H.

Little White Oak Mountain Conservation Development Redesign

- Total area: 35 acres.
- 32 single family units in total.
- Water: 0.77 acre pond and stream.
- Acres developed (parcels, roads and stormwater pond areas): 15 acres.
- Acres Undeveloped (all areas outside the development bubble plus open spaces in parks and trails): 20 acres.
- Total forest cover: 70 percent.
- Miles of proposed trails: 1/3 mile to join larger trail network on preserved upslope land.



The .75 acre pond offers serene vistas.

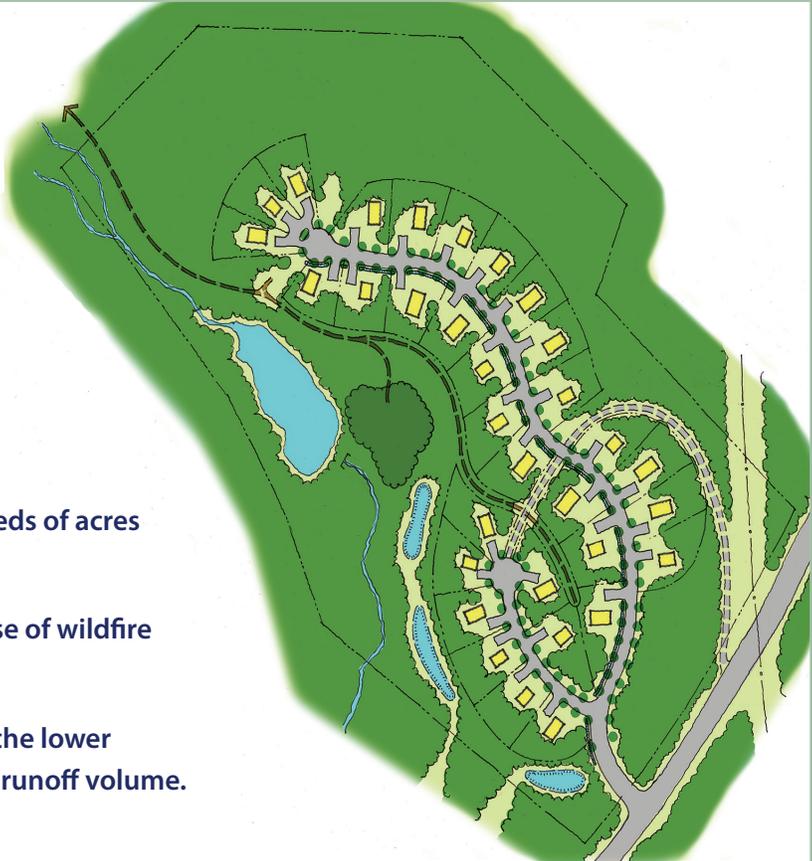


The development parcel for Little White Oak Mountain is part of a larger landscape of habitat cores that support rare, threatened and endangered species and provide abundant recreation opportunities.

Conservation subdivision design requires connecting forest cores from the site to the region.

Development Plan

- Lots remain mostly forested and total forest cover is 70 percent.
- Steep slopes and forest cores are protected.
- Streams and ponds are buffered with trees.
- Wetlands remain undisturbed.
- Trails provide access to the pond and hundreds of acres of adjacent park land.
- Additional entry is provided for access in case of wildfire or other emergency needs.
- Stormwater ponds have been proposed for the lower portions of the development to capture the runoff volume.



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